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(71) Applicant(s) Samsung Electronics Co., Ltd. (Incorporated in the Republic of Korea) 416 Maetan-dong, Paldal-gu, Suwon-city, Kyungki-do, Republic of Korea	(58) Field of Search UK CL (Edition R) H4K KBHC KFH , H4L LERA LESF INT CL ⁷ H04M 1/725 11/08 , H04N 5/445 , H04Q 7/32 On-Line - EPODOC, JAPIO, WPI
(72) Inventor(s) Jae-Duk Yang	
(74) Agent and/or Address for Service Harry Hutchinson Dibb Lupton Alsop, Fountain Precinct, Balm Green, SHEFFIELD, S1 1RZ, United Kingdom	

(54) Abstract Title
Handling incoming calls on a portable TV phone

(57) A mobile phone includes an integral television. When the phone is in TV mode, the user is informed of an incoming call 102 either by interrupting the TV sound or by displaying a character message on the screen 104. In response to this informing step, the user may either accept the call 108 or reject it 114. An automatic response mode may be selected in which the TV phone automatically switches to phone mode 106 in response to an incoming call.

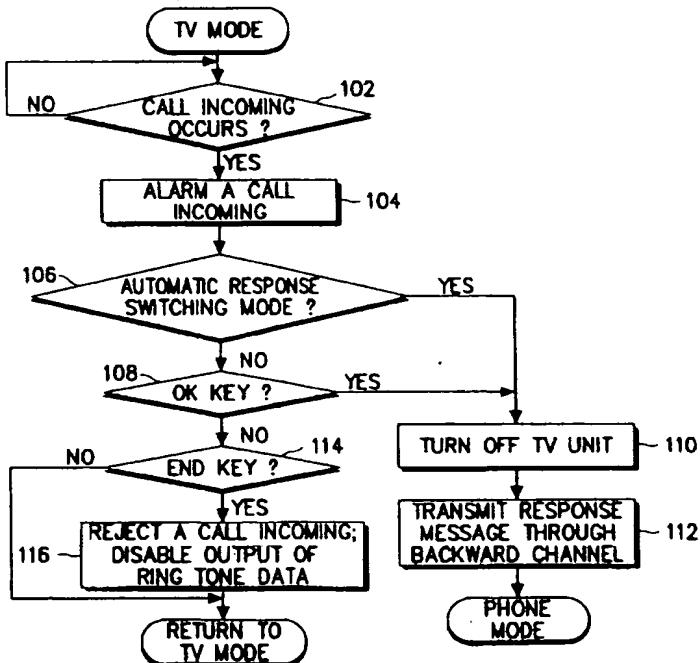


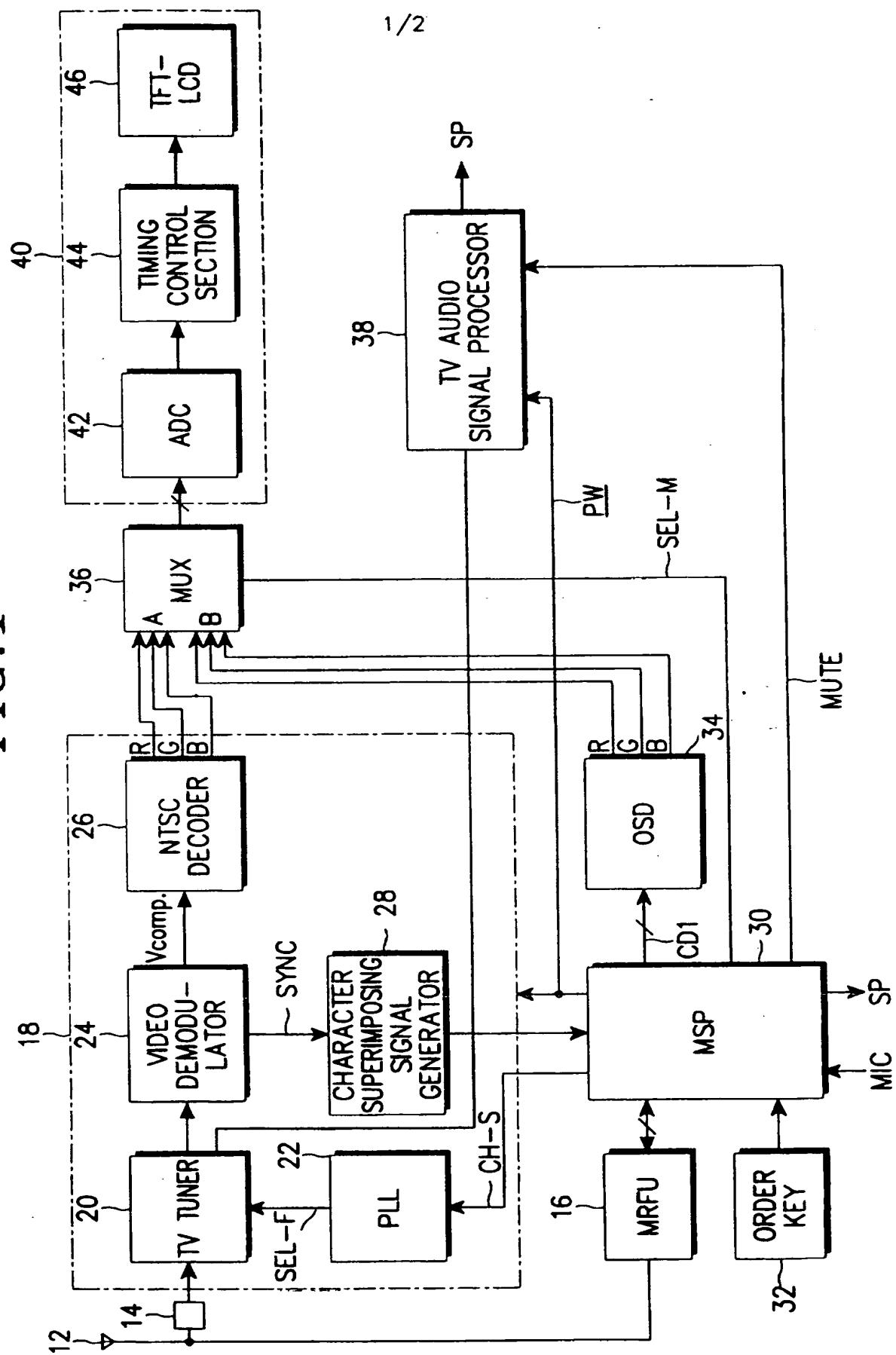
FIG.2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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FIG. 1



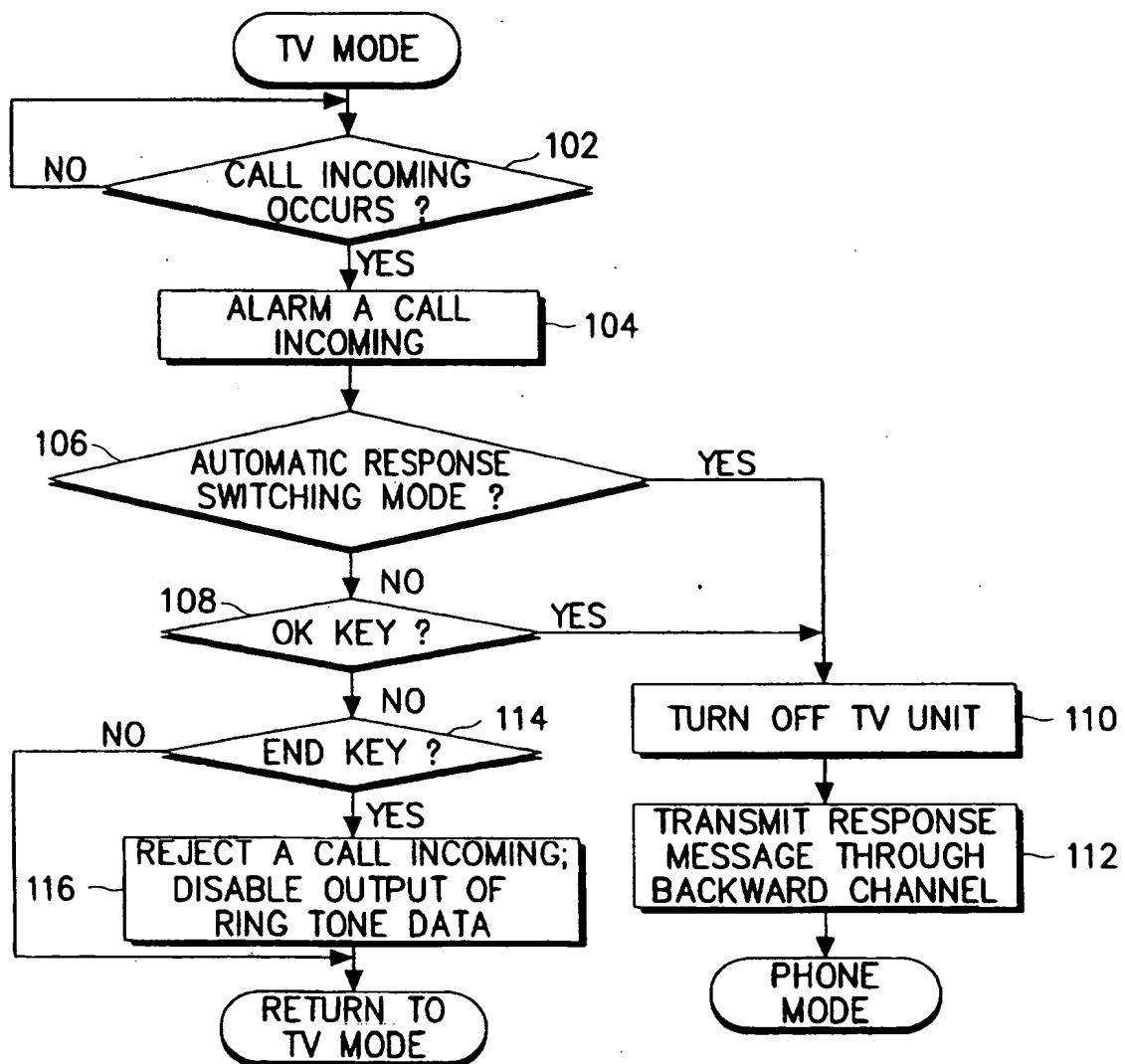


FIG.2

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**PORTABLE TELEVISION (TV) PHONE AND
METHOD OF OPERATION THEREOF**

The present invention relates to a portable TV phone and
5 a method for controlling operation of a hand-held portable
cellular telephone, and more particularly to a method for
controlling a switchover of an operational mode of a integrally
combined television (TV) and portable cellular phone
(hereinafter, referred to as "TV phone").

10 In recent years, rapid and wide spread use of a portable
cellular telephone as an ordinary personal communication
appliance in society has driven the desire of users toward
development of the portable phone with a variety of additional
functions besides a simple conversation function. For example,
15 such a portable phone has been developed having a calculating
function, a biorhythm checking function, and other functions
capable of transmitting/receiving images of a TV and a video
camera additionally included therein. The term "TV phone"
herein refers to a wireless portable cellular phones of all
20 types which allow for watching a television (TV) broadcast
program through a display unit of the portable phone in
addition to a cordless telephone conversation function for
telecommunication.

25 An example of the above TV phone is disclosed in Korean
patent application no 1995-46026 entitled "A Combined TV

Receiver and Cellular Phone" by LG Electronics Co., Ltd. earlier filed in the Korean Industrial Property Office on December 1 1995 and published on July 31 1997 by that Office.

For the above reception function for a TV broadcast, the 5 portable phone should be equipped with two radio frequency units therein as disclosed in the above prior art. The reaons for this is that a frequency bandwidth necessary for transmitting/receiving inherent messages (i.e., voice and data) is different to that for a TV broadcast. An operational mode of 10 such a phone can be classified into a phone mode, a waiting mode, and a TV mode also used as the waiting mode. As the TV phone should allow a user to watch and hear images and voices of the television broadcast program received in the TV mode through a display unit, i.e. a Thin Film Transistor (TFT) 15 Liquid Crystal Display (LCD), and a speaker or an earphone of the portable phone, it should be distinguished from a general portable phone by allowing a user to be informed of an incoming call and an incoming character message while in the TV mode state.

20 There is no method of immediately informing the user of the occurrence of an incoming call and/or an incoming character data message when the incoming of the call and/or the character data message occurs simultaneously with reception and output of TV images and audio in the TV mode.

There is therefore a need in the art for a portable TV phone that more rapidly and accurately informs a user that the incoming of both a call and a character data message has occurred when viewing any TV broadcast program in a TV mode.

5 There is also a need for a portable TV phone that allows the operational mode of the TV phone to be switched automatically from a TV mode to a phone mode so that the user i.e., a called party, can speak over the telephone with a calling party and the operation of circuits associated with a 10 TV function can be disabled to prevent consumption of battery power, when the user responds to an incoming call (in the case of gaining approval to speak by telephone in the phone mode) in a state in which a was watching a TV program using the TV phone. In particular, there is a need for a portable TV phone 15 that allows the user to reject the incoming call to continue to view the TV program on the air when the user does not wish to respond to the incoming call (in the case of not gaining approval of speaking by telephone in the phone mode) in a state in which the user is watching a TV program using the TV phone.

20

However, the TV phone in the above prior art can just control the cellular transmitter/receiver and TV receiver respectively by using only one microprocessor but not process a character message such as SMS (short message service) and so 25 on. Further, it is impossible to switch the TV mode to the phone mode when an incoming call is received during the TV

mode. Accordingly, the energy consumption of the battery is increased and it is very inconvenient for a user to switch the TV mode to the phone mode. Namely, the user has to turn off the TV phone and then switch the TV mode to the phone mode in 5 person with regard to every incoming call.

It is an object of the present invention to at least mitigate some of the problems of the prior art.

Accordingly, an embodiment of the present invention provides a method for controlling an operation mode switching of the TV phone including a TV unit for regenerating a video signal and an audio signal from a selected channel, a TV audio signal processor for processing the regenerated audio signal to output it as an audible sound, a display unit for displaying the audio signal input, an OSD for generating image characters and graphic images corresponding to an input of a control signal for generating characters, a multiplexer for selecting 10 one of the output signals of the OSD and the regenerated video signal for application to the display unit, an MRFU for receiving data of a forward channel transmitted from a base station, an MSP having a TV mode and a phone mode, the MSP being adapted to supply the TV unit with a channel selecting 15 signal in the TV mode while supplying the multiplexer with a control signal to control the output of the video signal, the 20 method comprising the steps of:

informing the user of an incoming call by the display of

any character message on the display unit or interruption of an audio sound output from a speaker of the TV phone, in response to an incoming call signal transmitted from the base state in a state in which the video and audio signals reproduced from the 5 TV unit are being reproduced and output through the display unit and the TV audio signal processor;

switching from the TV mode to the phone by disabling the operation of the TV unit in response to input of a command accepting the incoming call of a calling party by a user's 10 selection while transmitting an incoming call response message to the calling party through a backward channel; and

15 maintaining the TV mode by interrupting the reproduction and output of a ring tone data received through the forward channel in response to input of a command rejecting the incoming call of the calling party by user's selection.

Advantageously, embodiments of the invention provide a method for controlling the operational mode switching of a portable TV phone designed to allow selectively for transmission/reception of a voice and reception of a TV 20 program, in which the operational mode of the TV phone is automatically switched from a TV mode to a phone mode upon the occurrence of an incoming of a call by a calling party; and a method for controlling the operational mode switching of a portable TV phone which allows for automatically informing a 25 user i.e., a called party of an incoming of a call and allows the operational mode of the TV phone to be switched from a TV

mode to a phone mode or an incoming call rejection mode based on selection by the user when the user receives an incoming call signal from the calling party during the viewing of any TV program in a TV mode.

5 In accordance with one embodiment of the present invention, there provided a method for controlling operational mode switching of a portable TV phone including a TV unit for regenerating a video signal and an audio signal from a selected channel, a TV audio signal processor for processing the 10 regenerated audio signal to output it as an audible sound, a display unit for displaying the audio signal input, an ON-screen display, (hereinafter, referred to as "OSD"), for generating image characters and graphic images corresponding to an input of a control signal for generating characters, a 15 multiplexer for selecting one of the output signals of the OSD and the regenerated video signal for application to the display unit, a Mobile Radio Frequency Unit, (hereinafter, referred to as "MRFU"), for receiving data of a forward channel transmitted from a base station, a Mobile Station Processor, (hereinafter, 20 referred to as "MSP"), having a TV mode and a phone mode, for supplying the TV unit with a channel selecting signal in the TV mode while supplying the multiplexer with a control signal to control the output of the video signal.

The method comprises the steps of:

25 informing the user of an incoming of a call by the display of any character message on the display unit or

interruption of an audio sound being output from a speaker of the TV phone, in response to an incoming call signal transmitted from the base state when the video and audio signals reproduced from the TV unit are being reproduced and 5 output via the display unit and the TV audio signal processor;

switching from the TV mode to the phone mode by disabling the operation of the TV unit in response to input of a command to accept the incoming call of a calling party by user's selection while transmitting an incoming call response message 10 to the calling party through a backward channel; and

maintaining the TV mode by interrupting the reproduction and output of a ring tone data received through the forward channel in response to input of a command rejecting the incoming of the call from the calling party by user's 15 selection.

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

20 figure 1 is a block diagram illustrating the construction of a TV phone according to a preferred embodiment of the present invention; and

figure 2 is a flowchart illustrating the process of controlling operational mode switching of the TV phone 25 according to a preferred embodiment of the present invention.

Reference will now be made in greater detail to the

preferred embodiments of the present invention. In the following description of the present invention, only portions necessary for understanding the operation of the present invention are set forth, and a detailed description of known 5 functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

10 Figure 1 is a block diagram illustrating the construction of a TV phone according to a preferred embodiment of the present invention

15 In figure 1, reference numeral 16 designates an MRFU, reference numeral 30 designates an MSP, and reference numeral 32 designates a key pad of a portable phone module, respectively. Such circuits are configured in such a manner that the constructions for implementing the present invention are added to circuits applied to a conventional portable digital cellular phone, e.g., CDMA type portable cellular phone, and this construction and operation will be understood by reference to the following detailed description.

20 Also, reference numeral 18 designates a TV unit, reference numeral 34 designates an OSD, reference numeral 36 designates a multiplexer, (hereinafter, referred to as "MUX"), reference numeral 38 designates a TV audio signal processor, and reference numeral 40 designates a display unit,

respectively. The TV unit 18 and the TV audio signal processor 38 are TV modules.

Now, the operation of the TV phone according to an embodiment of the present invention will be described in detail 5 hereinafter with reference to figure 1.

First of all, suppose that the current operational mode of the TV phone is set to a TV mode. An alarm mode of an incoming call of the TV phone as shown in figure 1 can be mainly divided into three alarm modes to inform a user of the 10 incoming of the call. For example, the incoming call mode can be any one selected from the three incoming call modes which are a first incoming call mode for "on/off" switching an audio sound of the TV phone, a second incoming call mode for muting the audio sound of the TV phone and "on/off" switching of 15 output of an image of the TV phone, and a third incoming call mode for displaying an incoming call message at a specific region on a TV image displaying screen.

A radio-frequency, electromagnetic signal is received by an antenna 12 which converts the radio-frequency, 20 electromagnetic signal into an electrical signal which is supplied to a radio frequency filter, i.e., a bandpass filter 14. The bandpass filter 14 is operative to pass only frequency components of a frequency bandwidth for a TV broadcast. The bandpass filter 14 generates filtered signals, which are

applied to the TV unit 18.

At this time, when the current operational mode of the TV phone is set to a TV mode, the MSP 30 supplies a power control signal PW for the TV unit 18 and the TV audio signal processor 38 to operate the TV unit 18 and the TV audio signal processor 38. The MSP 30 uses a phase locked loop 20, (hereinafter, referred to as "PLL"), in the TV unit 18 with a channel selecting signal input from the key pad 32 or a channel selecting signal CH-S for selecting a previous viewing channel. Then, PLL 20 oscillates at a tuning frequency SEL-F corresponding to the channel selecting signal for application to a TV tuner 20. The TV tuner 20 combines the filtered signal input thereto from the bandpass filter 14 and the tuning frequency SEL-F from the PLL 20 to output the resultant down-converted video intermediate frequency (VIF) signal and audio intermediate frequency (AIF) signal.

A video demodulator 24 coupled to the output terminal of the TV tuner 20 demodulates the video intermediate frequency (VIF) signal to apply the resultant composite video signal Vcomp to a NTSC decoder, (video decoder), 26 while applying a synchronising signal SYNC of the composite video signal to a character superimposing signal generator 28. The NTSC decoder 26 decodes the composite video signal Vcomp to apply the decoded composite video signal as a colour signal of R, G, B to a terminal A of the MUX 36.

The character superimposing signal generator 28 counts the synchronising signal SYNC, and generates a character superimposing signal if the counted signal value is a predetermined value. That is, the character superimposing 5 signal generator 28 comprises a counter for counting a horizontal synchronising signal, a memory for storing a position value of a horizontal line, and a comparator for comparing the counted signal value from the counter and the output value from the memory and generating a character 10 superimposing control signal activated during a retrace period of the horizontal synchronising signal if the counted signal value from the counter is equal to the output value from the memory, and generates a character superimposing control signal of a regular interval in every field or frame period.

15 Accordingly, the TV unit as constructed above, is operated by activation of the power control signal from the MSP 30, and generates a video signal and an audio signal of a TV broadcast channel according to the channel selecting signal while generating an interval control signal for superimposing 20 an incoming character message on a screen of the display unit 40 when an incoming of a call occurs. The generation of such a character superimposing control signal will be advantageously used when a call incoming alarm mode is a text mode of a third call incoming mode.

Meanwhile, the MUX 36 is adapted to select the video signals R, G, and B input thereto from the NTSC decoder by a video selecting signal SEL-M output at a "low" state from the MSP 30 for application to an analog-to-digital converter (ADC) 42 of the display unit 40. The ADC 42 converts the selected video signals R, G, and B into digital signals which are applied to a timing control section 44. The timing control section 44, which includes a synchronising signal generator for generating a pseudo-vertical synchronising signal and a pseudo-
5 vertical synchronizing signal, drives a TFT-LCD 46 by the video data signals input thereto from the ADC 42 to allow any image to be displayed on a screen thereof. In addition, the TV audio signal processor 38 operated by the power control signal PW output from the MSP 30 processes the audio intermediate
10 frequency (AIF) signal input thereto from the TV tuner 20 to reproduce an audio signal for a TV program and output the reproduced audio signal through a transducer such as a speaker.
15

Accordingly, it can be seen that the TV unit 18, the TV
20 audio signal processor 38, and the display unit 40 as shown in figure 1 receive and reproduce a video signal and an audio signal for a TV program for a channel selection by the control of a TV mode of the MSP 30. During this operation, when a user manipulates a channel selection key arranged on the key pad 32
25 to select a desired channel, the MSP 30 changes the channel selecting signal CH-S so that the tuning frequency and the output of the PLL 22 are also changed, which in turn changes a

channel of the TV tuner.

Meanwhile, the MRFU 16 coupled to the antenna 12 receives a radio-frequency, electromagnetic signal of a transmitting/receiving frequency bandwidth for a portable 5 phone, converts an analog signal into a digital signal or converts a digital signal into an analog signal, and power-amplifies the converted signal to transmit it through the antenna 12. The MRFU 32 can be easily constructed by combining an RF unit and a baseband analogue circuit of a conventional 10 portable phone. For example, the MRFU 32 can be constructed by combining a CDMA type radio transceiver unit and a chip of "BBA2.X(Q5312CDMA)" manufactured by "QUALCOMM. Co." as a BBA circuit for converting an analog signal into a CDMA type digital data and vice versa, and an RF unit.

15 The MSP 30 coupled to the MRFU 16 analyses commands supplied from the key pad 32 and generates control signals corresponding to the commands. Further, the MSP 30 has a variety of functions such as analysis of a received forward channel data message, reproduction of an analog audio signal 20 from the received data by demodulating, and its reverse functions by de-interleaving, decoding, data signal processing, and vocoding of the digital signal input thereto from the MRFU 16. For example, the MSP 30 also has functions that output the reproduced analog audio signal through a speaker, and convert 25 an analog audio signal input thereto from a microphone (MIC)

into a CDMA type digital signal to allow the converted digital signal to be transmitted to a backward channel through the MRFU 16. In addition, the MSP 30 informs a user watching a TV program of reception of a call incoming from the calling party 5 through analysis of the call alarm mode set in an inner memory if the received forward channel data message is any message associated with a call incoming. The MSP 30 may be used as one of "MSMX2300" series of a one-chip type supplied from "QUALCOMM co." in U.S.A.

10 The OSD coupled to an output of the MSP 30 generates an OSD video signal corresponding to a character generating control data output from the MSP 30 for application to another input terminal of the MUX 36. In a TV mode, the MUX 36 selects the video signals R, G, and B input to the input terminal A 15 thereof by the video selecting signal SEL-M output at a "low" state from the MSP 30 for application to an analog-to-digital converter (ADC) 42 of the display unit 40.

20 Figure 2 is a flowchart illustrating the process of controlling an operational mode switching of the TV phone according to a preferred embodiment of the present invention, in which the operational mode of the TV phone of figure 1 is switched from a TV mode to a phone mode upon the reception of an incoming call message, or is maintained in the TV mode. A program for the flowchart is masked in a memory block of the 25 MSP 30 in shown in figure 1.

Referring now to figure 2, in a state in which a user watches the TV program of a desired channel of the TV phone in a TV mode, the MSP 30 monitors an output of the MRFU 16 and determines whether or not any incoming call message has been 5 received at step 102. If it is determined at step 102 that any message associated with an incoming call has not been received, the MSP 30 continues to operate in the TV mode. The term "any message associated with an incoming call" includes any ring information received by the portable phone and a character 10 message of SMS (short message service) presently provided by a portable phone.

On the other hand, if it is determined at step 102 that the MRFU 32 has received a message associated with an incoming call, the program proceeds to step 104 at which the MSP 30 15 detects the incoming call alarm modes set in the memory therein. The incoming call alarm mode herein means the above-mentioned first, second and third incoming call modes. At step 104, the MSP 30 informs a user that any incoming call occurs in accordance with the preset incoming call alarm mode. For 20 example, as one mode among a bell mode, a vibration mode and a lamp (soundlessness) mode is set as an incoming call alarm mode, an audio signal of a TV program or output of the OSD 34 is suitably controlled to alarm a user. Namely, a method of alarming a user by muting an output of the TV audio signal 25 processor 38, controlling a video output on the viewing screen

through the display unit 40 to switch a reproduced screen, or displaying a specific character thereon is applicable. Such a controlling operation can be implemented by controlling activation/deactivation of a mute signal MUTE applied to the TV 5 audio signal processor 38, and an output of the character generating control signal CD synchronised with the audio selection signal SEL-M of the MUX 36 and the character superimposing signal for application to the OSD 34.

Subsequently, the program proceeds to step 106 at which 10 it is determined by the MSP 30 whether or not an automatic response switching mode has been set through detection of a flag of the memory therein. The term "automatic response switching mode" means an operational mode set by a user to allow for speaking by telephone with a calling party through an 15 automatic response to the occurrence of a call incoming upon the occurrence of the incoming call.

If it is determined at step 106 that the automatic response switching mode has been set, the program proceeds to step 108 where the MSP 30 turns off the TV unit 18 and the TV 20 audio signal processor 38 through the switching from an activation state to a deactivation state of the power control signal PW. The aim is to reduce the consumption of battery power. At subsequent step 110, the MSP 30 switches from the TV mode to the phone mode by supplying the MRFU 16 with a response 25 message for the incoming call. The MRFU 16 receiving the

incoming call response message from the MSP 30 transmits the received incoming call response signal to the base station through the reverse channel to establish a telephone conversation channel to speak over the telephone with a calling 5 party such as a call procedure of a conventional portable phone.

If, on the other hand, it is determined at step 106 that that the automatic response switching mode is not preset, the program proceeds to step 108 where the MSP 30 determines if a 10 selecting signal of a phone call allowing key (any other key except a SEND key, an OK key or an END key) arranged on the key pad 32 is generated. At this time, when a user watching any TV program recognises an incoming call and selects a SEND key etc., the program proceeds to step 110 where the MSP 30 15 executes the above-mentioned process following the step 110 to turn off the TV unit so that the user, i.e. called party, can speak over the telephone with the calling party.

On the other hand, if it is determined at step 108 that the selecting signal of a phone call accept key is generated, 20 the program proceeds to step 114 at which the MSP 30 determines by reading output of the key pad 32 whether or not any key for rejecting an incoming call, for example, an END key is selected. At step 114, if any key on the key pad 32 is not selected, the MSP 30 determines that a user does not recognise 25 the incoming call and executes repeatedly the above-mentioned

process following the step 102. Accordingly, when an incoming call message is received from the base station through the forward channel, the MSP 30 informs the user that an incoming call occurs through a process routine of the step 104.

5 At the step 114, if a user recognising an incoming call selects an END key on the key pad 32 in order to reject telephone conversation with the calling party in a state in which a video signal and audio signal are reproduced and output, the program proceeds to step 116 where the MSP 30 10 rejects an incoming of a call. Such a rejection of the incoming call is performed by allowing the MSP 30 analysing data of the forward channel received through the MRFU 32 to disable an output of a ring tone data output to the speaker SP by ring data included in the data of the forward channel. When 15 an output of data associated with an incoming call ring, (i.e. a ring signifying an incoming call) presently is disabled, an image and an audible sound of a selected channel are reproduced and output continuously through the TFT-LCD 46 of the display unit 40 and the TV audio signal processor 38

20 As apparent from the above description, the TV phone of the present invention provides an advantage in that in a state in which a user watches any TV program in a TV mode, when an incoming of a call occurs, a user is informed of this, and the operational mode of the TV phone is switched automatically from 25 a TV mode to phone mode to turn off a TV unit, thereby

preventing excessive discharge of a battery due to a simultaneous operation of a TV and a portable phone and improving efficiency of use of the TV phone.

5 While the description in the above embodiment is made about the TV unit for outputting the R.G.B video signal, the display unit for converting the analogue video signal to the digital video signal and then displaying the converted signal and the multiplexer for transmitting TV video signal and the 10 video signal of the OSD to the display unit selectively, the above structural elements can be replaced with other elements having the same functions by a person skilled in the art.

For instance, it is possible to make the TV unit to 15 output analog complex video signal and complex synchronising signal and construct the display unit with LCD drice and TFT-LCD for displaying image by the complex video signal and complex synchronising signal. In the case of displaying image of the TV by the complex video signal and complex synchronising 20 signal, the image of the OSD can be displayed by using the video memory (video memory or video ROM) and the timing generator for indicating the complex video signal. As a result, the switching operation in the multiplexer is not necessary and the time for displaying the image of the OSD can be reduced.

25

In addition, in the TV phone of the present invention, the operational mode of the TV phone is relatively easily

switched from the TV mode to the phone mode while interrupting power supplied to a TV module related circuit when an incoming call occurs during the viewing of any TV program in a TV mode, thereby reducing battery power consumption.

5 While this invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not limited to the disclosed embodiment, but, on the contrary, it is intended to cover various modifications within
10 the spirit and scope of the appended claims.

CLAIMS

1. A method for controlling an operation mode switching of the TV phone including a TV unit for reproducing and outputting a video signal and an audio signal from a selected channel, a display unit connected to said TV unit for displaying said video signal, a TV audio signal processor for outputting said audio signal as audible sound, a MRFU for receiving data of a forward channel transmitted from a base station, and a MSP for providing channel selecting signal to said TV unit responsive to the TV mode transmitting/receiving an audio signal by controlling said MRFU in response to the phone mode a method of controlling an operation mode switching of the TV phone comprising the steps of:
 - 15 informing the user of an incoming call by the display of any character message on the display unit or interruption of an audio sound output from a speaker of the TV phone, in response to an incoming call signal transmitted from the base state in a state in which the video and audio signals reproduced from the TV unit are being reproduced and output through the display unit and the TV audio signal processor;
 - 20 switching from the TV mode to the phone by disabling the operation of the TV unit in response to input of a command accepting the incoming call of a calling party by a user's selection while transmitting an

incoming call response message to the calling party through a backward channel; and

5 maintaining the TV mode by interrupting the reproduction and output of a ring tone data received through the forward channel in response to input of a command rejecting the incoming call of the calling party by user's selection.

2. A method as claimed in claim 1, wherein the switching step further comprises the step of disabling the 10 operation of the TV unit by interrupting power supply voltage supplied to the TV module.
3. A method as claimed in either of claims 1 or 2, wherein the switching step further comprising the step of disabling the operation of the TV unit while transmitting 15 a response message for the incoming call to the calling party through a reverse channel when an incoming call mode preset by the user is an automatic response switching mode after informing the user of the incoming call and clearing the character message displayed on the screen of the display unit to display images of the TV 20 program on the air, in response to input of an output terminating signal of the received character message.
4. A method of controlling operational mode switching of a 25 TV phone substantially as described herein with reference

to and/or as illustrated in the accompanying drawings.

5. An apparatus for controlling an operation mode switching of the TV phone including a TV unit for regenerating a video signal and an audio signal from a selected channel, a TV audio signal processor for processing the regenerated audio signal to output it as an audible sound, a display unit for displaying the audio signal input, an OSD for generating image characters and graphic images corresponding to an input of a control signal for generating characters, a multiplexer for selecting one of the output signals of the OSD and the regenerated video signal for application to the display unit, an MRFU for receiving data of a forward channel transmitted from a base station, an MSP having a TV mode and a phone mode, the MSP being adapted to supply the TV unit with a channel selecting signal in the TV mode while supplying the multiplexer with a control signal to control the output of the video signal, the apparatus comprising:

20 means for informing the user of an incoming call by the display of any character message on the display unit or interruption of an audio sound output from a speaker of the TV phone, in response to an incoming call signal transmitted from the base state in a state in which the video and audio signals reproduced from the TV unit are being reproduced and output through the display unit and the TV audio signal processor;

means for switching from the TV mode to the phone by disabling the operation of the TV unit in response to input of a command accepting the incoming call of a calling party by a user's selection while transmitting an incoming call response message to the calling party through a backward channel; and

means for maintaining the TV mode by interrupting the reproduction and output of a ring tone data received through the forward channel in response to input of a command rejecting the incoming call of the calling party by user's selection.

6. A apparatus as claimed in claim 1, wherein the means for switching further comprises means for disabling the operation of the TV unit by interrupting power supply voltage supplied to the TV module.

7. A apparatus as claimed in either of claims 5 or 6, wherein the means for switching further comprising means for disabling the operation of the TV unit while transmitting a response message for the incoming call to the calling party through a reverse channel when an incoming call mode preset by the user is an automatic response switching mode after informing the user of the incoming call and means for clearing the character message displayed on the screen of the display unit to display images of the TV program on the air, in response

to input of an output terminating signal of the received character message.

8. An apparatus of controlling operational mode switching of
5 a TV phone substantially as described hereinwith
reference to and/or as illustrated in the accompanying
drawings.



INVESTOR IN PEOPLE

Application No: GB 9930488.3
Claims searched: 1 to 3, 5 to 7

Examiner: Jared Stokes
Date of search: 26 June 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H4K (KBHC, KFH)
H4L (LERA, LESF)

Int Cl (Ed.7): H04M (1/725, 11/08)
H04N (5/445)
H04Q (7/32)

Other: On-Line - EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2 297 665 A (Scotland) See abstract	1,2,5,6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.